

## REMARKS

This Amendment, submitted for filing with an RCE being filed concurrently herewith, is responsive to the Final Office Action mailed April 16, 2007 which superseded the Final Office Action mailed February 26, 2007.

In accordance with the foregoing, new claims 11-15 are presented. No new matter is presented in any of the foregoing and, accordingly, approval and entry of the new claims are respectfully requested.

### Statement Of Substance Of Interview

An interview was conducted between the Applicants' representative and the Examiner and the Examiner's supervisor on April 25, 2007. Applicants thank the Examiner and the Examiner's supervisor for the opportunity to conduct the interview.

During the interview, Applicants representative pointed out to the Examiner and the Examiner's supervisor features of the present invention that distinguish patentably over the art currently relied on by the Examiner, i.e., Abe (Pub. No. US 2003/0136577). Further, Applicants' representative pointed out why a person of ordinary skill in the art would not have modified Abe in a manner as the Examiner asserts.

### Item 4: Rejection Of Claims 1-10 under 35 U.S.C. §103(a) as being unpatentable over Abe (Pub. No. US 2003/0136577)

In Item 4 of the Office Action, the Examiner rejects claims 1-10 under 35 U.S.C. §103(a) as being unpatentable over Abe. (Action at pages 3-5). The rejection is traversed.

Independent claim 1 recites a semiconductor device substrate comprised of a core substrate having, on both main surfaces of which, respective interconnect patterns extending through resin layers, "wherein: the core substrate being of a material having a heat expansion coefficient closer to that of a semiconductor chip than the respective heat expansion coefficients of the resin layers and the interconnect patterns, and a resin layer, forming an outermost layer of the semiconductor device substrate on each of the main surfaces thereof, of a material having at least one of a higher strength and a higher elongation than a resin material used for inner resin layers of the semiconductor device substrate and preventing cracking and deformation, of the semiconductor device substrate due to thermal stress occurring between two or more of the core substrate, the inner resin layers, and the interconnect patterns in the semiconductor device substrate." (emphasis added). Independent claims 5 and 9 have similar recitations.

That is, according to independent claims 1, 5, and 9, the specific characteristics of

strength and/or elongation of the outermost resin layer are different from the specific characteristics of strength and/or elongation of the inner resin layer. Abe does not teach that the specific characteristics of strength and/or elongation are different respectively for an outermost resin layer and inner resin layer.

The Examiner asserts Abe teaches:

thermal expansion coefficient and strength of the device can be adjusted depending on the material parts selected.

(Emphasis added, Office Action, page 5, lines 19-21).

As discussed during the in-person interview, Applicants submit that the Examiner's interpretation of Abe is incorrect. By contrast, Abe merely teaches, for example:

[C]arbon fibers arranged in the core layer include a first and a second carbon fiber groups which are arranged in different direction to intersect each other, whereby a thermal expansion coefficient and strength of the core layer can be adjusted for arrangement directions of the first and the second carbon fiber groups by arranged amounts and cross angles of the first and the second carbon fiber groups. The thermal expansion coefficient and strength of the circuit board can be adjusted corresponding to electronic parts to be mounted.

(See, for example, paragraph [0019]).

That is, Abe teaches an adjustment of properties of a core layer by using different arrangements of carbon fibers, and not by using an adjustment of resins.

Applicants note that during the interview the Examiner asserted that since Abe included a table, i.e., Table 1, that lists resin materials which one of ordinary skill in the art could have used to modify Abe to construct a device as recited by claim 1, for example. Applicants submit, however, that the Examiner's proposed modifications of Abe are not reasonable and that *prima facie* obviousness of these modifications has not been established.

The USPTO Deputy Commissioner for Patent Operations, in view of a recent U.S. Supreme Court Decision, i.e., *KSR Int'l Co. v. Teleflex, Inc.*, No. 04-1350 (U.S. Apr. 30, 2007), issued a Memorandum on May 3, 2007 to the USPTO Technology Center Directors to provide interim guidance on establishing *prima facie* obviousness. The Deputy Commissioner asserted:

[I]n formulating a rejection under 35 U.S.C. §103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.

(Emphasis added).

A copy of the Memorandum is attached for the Examiner's convenience.

Applicants respectfully submit that the Examiner continues to fail to establish *prima facie* obviousness in view of the USPTO guidance and submit that a person of ordinary skill in the art would not have modified Abe as the Examiner asserts.

In particular, Abe teaches:

[T]he thermal expansion coefficients of invar, covar, alloys, such as silicon steel, and a clad material, such as CIC, are substantially the same as the thermal expansion coefficient of silicon. However, they have large specific gravities and add weights unsuitably to be used in the circuit boards, which are processed with the large-sized cores included. Their Young's moduli of elasticity are not high, and large core substrate(s) undesirably have bowing and waves, which causes troubles in the build-up process and in mounting semiconductor elements.

(Emphasis added, see, for example, paragraph [0010]).

That is, Abe teaches that a core, as recited by claim 1, for example, including a "substrate being of a material having a heat expansion coefficient closer to that of a semiconductor chip" is unsuitable. Abe teaches, instead, a core substrate that is a fiber reinforced metal, and different compositions and rearrangements of a core by rearranging carbon fibers, for example.

Applicants submit that one of ordinary skill in the art would not modify Abe, which teaches adjusting thermal coefficients and strengths of a core layer by rearranging carbon fibers, to substitute a core that Abe teaches is undesirable and unsuitable and select relative resin compositions and respective orientations as recited by claim 1, for example.

### Summary

Since *prima facie* obviousness is not established, the rejection of claim 1-10 should be withdrawn and claims 1-10 allowed.

### New Claims

New claims 11-15 are presented to recite features of the invention in a different fashion.

New claim 11 recites a semiconductor device substrate wherein "the core substrate. . . [is]. . . a metal alloy having a heat expansion coefficient closer to that of a semiconductor chip than the respective heat expansion coefficients of the resin layers and the interconnect patterns."

(emphasis added). New dependent claim 12 recites a semiconductor device substrate according to claim 11, wherein "the metal alloy. . . [is]. . . an iron-nickel alloy." (emphasis and insert added).

New claim 13 recites a substrate for a chip including "a metal alloy core underlying the third resin layer having, on both main surfaces, respective interconnect patterns between the core and at least one of the first resin layer, the second resin layer, and the third resin layer." (emphasis added).

New claim 14 recites a topology for a chip including "a fiberless core underlying the third insulating layer having, on both main surfaces, respective interconnect patterns between the metal alloy core and at least one of the first insulating layer, the second insulating layer, and the third insulating layer." (emphasis added). New dependent claim 15 recites a topology for a chip according to claim 14 "wherein the fiberless core being an iron-nickel alloy."

Support for these features are found, for example, in paragraph [0010] and Figure 4 of the specification.

Particularly, Abe does not teach or suggest a semiconductor device substrate having a "core substrate being of a metal alloy," a substrate for a chip including "a metal alloy core underlying the third resin layer, nor a topology for a chip including "a fiberless core." Claims 11-15 are submitted to distinguish patentably over the art currently relied on by the Examiner, and to be allowable for the recitations therein.

### CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

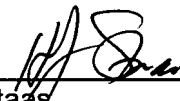
If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

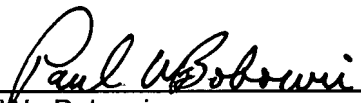
Respectfully submitted,

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MEMORANDUM

DATE: May 3, 2007

TO: Technology Center Directors

FROM: *Margaret A. Focarino*  
Margaret A. Focarino  
Deputy Commissioner  
for Patent Operations

SUBJECT: Supreme Court decision on *KSR Int'l. Co., v. Teleflex, Inc.*

The Supreme Court has issued its opinion in *KSR*, regarding the issue of obviousness under 35 U.S.C. § 103(a) when the claim recites a combination of elements of the prior art. *KSR Int'l Co. v. Teleflex, Inc.*, No 04-1350 (U.S. Apr. 30, 2007). A copy of the decision is available at <http://www.supremecourtus.gov/opinions/06pdf/04-1350.pdf>. The Office is studying the opinion and will issue guidance to the patent examining corps in view of the *KSR* decision in the near future. Until the guidance is issued, the following points should be noted:

- (1) The Court reaffirmed the *Graham* factors in the determination of obviousness under 35 U.S.C. § 103(a). The four factual inquiries under *Graham* are:
- (a) determining the scope and contents of the prior art;
  - (b) ascertaining the differences between the prior art and the claims in issue;
  - (c) resolving the level of ordinary skill in the pertinent art; and
  - (d) evaluating evidence of secondary consideration.

*Graham v. John Deere*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966).

- (2) The Court did not totally reject the use of “teaching, suggestion, or motivation” as a factor in the obviousness analysis. Rather, the Court recognized that a showing of “teaching, suggestion, or motivation” to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious under 35 U.S.C. § 103(a).

- (3) The Court rejected a rigid application of the “teaching, suggestion, or motivation” (TSM) test, which required a showing of some teaching, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the prior art elements in the manner claimed in the application or patent before holding the claimed subject matter to be obvious.

(4) The Court noted that the analysis supporting a rejection under 35 U.S.C. § 103(a) should be made explicit, and that it was “important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements” in the manner claimed. The Court specifically stated:

Often, it will be necessary . . . to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an **apparent reason** to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis **should be made explicit**.

*KSR*, slip op. at 14 (emphasis added).

**Therefore, in formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.**